

FIVE-YEAR REVIEW REPORT

Palmerton Zinc Pile

Superfund Site

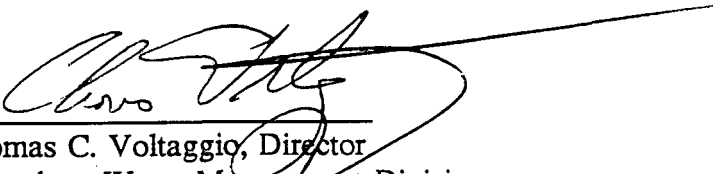
Palmerton, Carbon County, Pennsylvania

Prepared by:

U.S. Environmental Protection Agency

Region III

Philadelphia, Pennsylvania


Thomas C. Voltaggio, Director
Hazardous Waste Management Division

9/26/96
Date

U. S. Environmental Protection Agency
Region III
Hazardous Waste Management Division
Five-Year Review (Type Ia)
Palmerton Zinc Pile Site - Palmerton, Pennsylvania

I. Introduction

Authority Statement. Purpose. EPA Region III conducted this review pursuant to CERCLA section 121(c), NCP section 300.400(f)(4)(ii), and OSWER Directives 9355.7-02 (May 23, 1991), and 9355.7-02A (July 26, 1994). It is a statutory review. The purpose of a five-year review is to ensure that a remedial action remains protective of public health and the environment and is functioning as designed. This document will become a part of the Site File. This review (Type Ia) is applicable to a site at which response is ongoing.

Site Characteristics.

The Palmerton Zinc Superfund Site is located in the Borough of Palmerton, Carbon County, PA about 20 miles north of Allentown. Approximately 6500 residents live in Palmerton. From 1898 to about 1981, a zinc smelter was operated within the Borough. The smelter was purchased in 1967 from private ownership by Gulf and Western Corporation (G&W). In 1981, Horsehead Industries, Inc. purchased the smelters. The site was placed on the National Priorities List (NPL) in Dec. 1982.

The smelting operations were located at two separate plant locations. The west plant smelter began operations in 1898, and the east plant in 1911. Both plants ceased operations about 1981. The facility recovered zinc and other metals for the manufacture of machinery, pharmaceuticals, pigments, and other products.

The primary zinc smelting operation utilized concentrated sulfide ores. The smelters over the years have emitted vast quantities of zinc, lead, cadmium, and sulfur dioxide. This pollution led to the defoliation of approximately 2000 acres on Blue Mountain, deposition of heavy metal contamination within the Borough and the valley, and the stockpiling of approximately 32,000,000 tons of slag. The slag pile, which is called the Cinder Bank, is causing pollution of the shallow aquifer and the Aquashicola Creek which flows through the Borough into the Lehigh River. It was apparently common practice to deposit this slag material in this waste pile before it was fully quenched. Therefore significant parts of the interior of the Cinder Bank continue to burn.

Surface soil samples taken on Blue Mountain revealed contamination levels of cadmium from 364 ppm to 1,300 ppm, lead from 1,200 ppm to 6,475 ppm, and zinc from 13,000 ppm to 35,000 ppm. Most of this contamination is contained within the top 6 to 10 inches of soil. This is because the metals are bound in organic materials which prevents more significant downward movement of metals.

The Cinder Bank is approximately 2.5 miles long, 200 feet high, 200 feet wide at its crest, and 1,000 feet wide at the base. The Cinder Bank consists of mostly residual metals and carbonaceous material. As a result of either incomplete quenching or spontaneous combustion, portions smoulder continuously. The contamination within the Cinder Bank consists of 3,600 ppm lead, 250 ppm cadmium, and 27,000 ppm zinc, as well as other metals.

Since 1981, when Horsehead Industries, Inc. bought the facility, it has been operated as a hazardous waste recycling facility. It presently processes RCRA waste number K061, electric arc furnace (EAF) dust. This dust is a residue from the steel mill industry which contains significant levels of several hazardous metals, including lead, cadmium and zinc. Horsehead Industries Inc. (HII) is the parent company with two subsidiaries. The first is Zinc Corporation of America (ZCA) the facility operator. The second is Horsehead Resource Development Company (HRD) which is responsible for research and development, including considerable management of the remedial action in progress on Blue Mountain, the only remedial action underway at this time.

II. Discussion of Remedial Objectives; Areas of Noncompliance.

The Site has been divided into four operable units. The following is a brief history of the first operable unit (OU), the Blue Mountain Restoration Project:

Operable Unit # 1 - Blue Mountain

OU # 1 consists of the revegetation of approximately 2,000 acres on Blue Mountain under an interim remedy [see enclosed excerpts from the Declaration for the Record of Decision (ROD)]. The Remedial Investigation and Feasibility Study (RI/FS) was conducted by EPA. The ROD was issued on September 4, 1987. The selected interim alternative is to apply a sludge/lime/fly ash mixture with grass seeds and tree seeds. While not addressing

all applicable or relevant and appropriate requirements (ARARs), the selected alternative was deemed consistent with those action-specific ARARs addressing sludge application, a special concern of the Commonwealth of Pennsylvania, who accepted the ROD.

A Consent Decree (CD) to perform the remedial design and remedial action (RD/RA) was entered into between EPA, ZCA, and HRD on Oct. 18, 1988. The final plans were received in EPA on April 15, 1991. Approval to start construction was given on May 7, 1991. Approximately 200 acres per year were scheduled for remediation.

The ROD refers to the remediation of 2,000 acres, however the exact limits of restoration were not precisely established. Approximately 775 acres has undergone the sludge/lime/flyash plus grass/tree seeds application process. A timber survey conducted in 1994-1995 by the Potentially Responsible Party(ies)(PRPs) identified areas where sufficient tree density per the requirements of the remedial design (435 live trees per acre) already existed and thus did not require remediation. The U. S. Army Corps of Engineers (USACE) , Tobyhanna, PA has been EPA' s RA oversight contractor since 1990 and has extensive experience with this effort. As of this date, the remedy (i.e. sludge/lime/fly ash mixture with grass seeds and tree seeds) has been applied to those areas specified in the RD.

In conjunction with that oversight, an audit report was prepared by the U.S. Army Corps of Engineers (USACE) Waterways Experiment Station (WES), and the USACE Cold Regions Research and Engineering Laboratory (CRREL) at the request of U.S. EPA Region III (USEPA) concerning the restoration success of the interim remedial action. That report, date January 25, 1995, concluded the following:

- The application of the sludge/ lime/flyash mixture (ECOLOAMtm) appeared to stabilize the treated areas, reduce soil erosion and improve soluble (contaminant metals) water quality associated with runoff to a large extent.
- Soluble concentrations of metals were still above water quality criteria.
- Plant-available metals from the contaminated soil were not affected or may have increased, resulting in plants continuing to take up excessive metals, and potentially contaminate foodchains.
- While establishment of grass cover appeared successful, reestablishment of tree cover did not. Of 14 test plots evaluated, eleven had tree counts of less than the 435 live woody stems per acre called for in the remedial design.
- The establishment of the indigenous volunteer birch and poplar species, known to take up hazardous metals from the soil into leaves, could make these metals available to the foodchain, especially invertebrates, via leaf litter. This could be counterproductive to the remedial objective of in- situ stabilization of hazardous metals in the soil, and, in conjunction with a newly vegetated Mountain, attract wildlife to a potentially contaminated foodchain.
- USACE WES/CRREL observations have not shown tap root penetration below the ECOLOAM layer.

The PRPs, at the suggestion of USACE WES/CRREL and EPA, planted test plots of tree seedlings in late 1995. This involved breaking through surface soil with a dibble bar, then planting seedlings into the subsoil, with some augmented by ECOLOAM, to allow the tap root access to soil below the contaminated layers. This effort utilized low metals uptake species (oak and maple) and is being evaluated at this time. Tree seedlings were the specified alternative in the ROD if the tree seed would not adequately germinate.

The Site has three other operable units. The following is a brief history and current status of each:

Operable Unit #2

This OU deals with remediation of the Cinder Bank. In September 1985, HRD and ZCA entered into a Consent Decree to conduct a RI/FS for the Cinder Bank. A ROD was issued on June 29, 1988. The selected alternative included the following:

1. Slope modification to enhance precipitation runoff from the Cinder Bank, thus reducing the amount of infiltration through the Cinder Bank. Grading specification are to be developed in the Pre- Design.
2. Construction of surface water diversion channels to collect the runoff from Blue Mountain and the Cinder Bank, and the leachate from the Cinder Bank. This water is to be treated prior to entering the stream.
3. Construction of a cap consisting of a minimum of 18 inches of soil and 6 inches of clay or a soil/ bentonite mixture.
4. Vegetative cover consisting of a sludge/ lime/ fly ash mixture, grass seeds, and tree seedlings.

This alternative has been the subject of controversy between the PRPs and the Pennsylvania Department of Environmental Protection (PADEP) and is currently being reevaluated by EPA. Specifically, PADEP has claimed that the slope modifications must meet their Municipal Landfill Regulations and that the fires within the Cinder Bank must be extinguished. In EPA's Engineering Evaluation and Cost Analysis (EE/CA) for this remedy, EPA's contractor, Black & Veatch Waste Sciences, Inc. estimated that the cost to implement the PADEP's cap and extinguish the interior fires would be approximately \$250 million.

The PRPs agreed to perform additional studies in support of a possible alternative remedy. These included an air monitoring program to determine if the fires present an environmental threat, and the investigation of some latest recycling technology. Work began in 1992 and was completed in 1994. The collective results of these studies were inconclusive.

On July 20, 1994, EPA Region III's Hazardous Waste Management Division (HWMD) invited HRD (a subsidiary of HII) to submit a work plan for a demonstration project to attempt to vegetate areas of the Cinder Bank under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, i.e. Superfund). On November 13, 1995, the United States entered into a Consent Decree (CD) with HII regarding multiple complaints under the Resource Conservation and Recovery Act (RCRA), the Clean Air Act (CAA) and the Clean Water Act (CWA) which, among other things, resulted in a very similar vegetation project being presented to EPA Region III's Water Division (WATER) as a pollution reduction technology (PRT) in the CD. Specifically this approach was advanced as a means of achieving the effluent limitations described in that CD.

In January 1996, EPA HWMD found that the vegetation project proposed as part of this CD essentially duplicated the demonstration work originally proposed by HRD to HWMD under Superfund. For this reason, EPA Region III HWMD decided that they would evaluate HII/ HRD's effort to vegetate those portions of the Cinder Bank described in the CD under the oversight of WATER. To date, HII/HRD has taken NO action on this project, having claimed a force majeure issue against PADEP. In August 1996 the United States Department of Justice (DOJ) addressed this issue and gave notice to the PRPs to begin work.

Operable Unit # 3 - Offsite Soil Study

In Oct. 1991, EPA began a comprehensive environmental sampling program in conjunction with the ATSDR health testing in Palmerton and Jim Thorpe. The EPA environmental sampling final report was issued in January 1995.

In Spring of 1992, EPA's National Enforcement Investigations Center (NEIC) in Denver, CO began a source identification study to determine the various sources of the contamination in the Borough of Palmerton. This study was completed in June 1994 and concluded that over 90% of the lead, cadmium and zinc contamination in Palmerton was due to past primary zinc smelting, approximately 10% was due to contemporary (since 1981) EAF dust recycling activities and contamination due to lead-based paint, long claimed a major source by some factions in Palmerton was " insignificant."

A health study by the Agency for Toxic Substances and Disease Registry (ATSDR) was completed in April, 1994. Among its findings were that 27% of children tested by ATSDR in Palmerton had elevated blood lead levels, that is, blood lead levels of 10 ug/dL or higher.

Following two unsatisfactory efforts by the PRPs, EPA Region III began a (Super) Fund-lead risk assessment for the Borough of Palmerton in March 1995. EPA has invited both the community and the PRPs to participate in this endeavor. This risk assessment is expected to be completed by the end of this year and EPA plans to issue a ROD for OU #3 by late 1997 or early 1998.

Operable Unit # 4 - Areawide Groundwater/ Surface Water Investigation

This investigation is to involve the groundwater, surface water, and the any effects from existing solid waste management units within the operating facility on same. An areawide ecological risk assessment will also be included in this operable unit.

EPA invited the PRPs to undertake the RI/FS for this operable unit via Special Notice issued in December 1995. The PRPs declined in early 1996. EPA took over the RI/FS for Operable Unit # 4 effective June 1996 as another Fund-lead effort and expects to begin work before the end of the year.

III. Recommendations.

EPA/USACE will continue to evaluate the success of the interim remedy applied to the first 1,000 acre area of Blue Mountain, Operable Unit # 1. EPA/USACE will also continue to explore current and future methods of reforestation with the PRPs to meet the tree establishment and other requirements in the remedial design. The issue of maintaining adequate in-situ stabilization of hazardous metals in the soil to prevent potential recontamination of the food chain will also be a part of this effort.

EPA will likewise continue to address immediate and long term threats to human health and the environment as characterized by the other operable units.

IV. Statement on Protectiveness.

The remedy is not at this time protective of human health and the environment. EPA is taking steps to make the remedy protective. (See III. Recommendations above).

V. Next Five-Year Review.

The next five-year review will be completed no later than September 30, 2001.

Enclosure:

Concurrence

FMACMILLAN	ADAPPOLONE	PSCHALL	AFERDAS	TVOLTAGGIO	GRANAM
(3HW21)	(3HW21)	(3HW20)	(3HW02)	(3HW01)	3 HW02
9/24/96	Ona	INS	9/24/96		9/25/96

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Palmerton Zinc Superfund Site - Blue Mountain Operable Unit Town of Palmerton, Carbon County, Pennsylvania

STATEMENT OF PURPOSE

This decision document represents the selected remedial action for this site developed in accordance with CERCLA, an amended by SARA, and to the extent practicable, the National Contingency Plan.

STATEMENT OF BASIS

This decision is based upon the administrative record (index attached) . The attached index identifies the items which comprise the administrative record upon which the selection of a remedial action is based.

DESCRIPTION OF THE SELECTED REMEDY

This is an interim remedy...(indeciferable)...of three separate operable units at(indeciferable). The other two operable units are being investigated by the responsible parties and will be addressed at a later date.

The selected site remedy does not attempt to ensure compliance with all ARARS, but will be consistent, to the extent practicable, with those action specific ARARS addressing sludge application, the Clean Water Act and Best Management Practice requirements.

The selected remedy consists of using a mixture of sewage sludge and fly ash to revegetate the defoliated areas of Blue Mountain. The general procedures for the revegetation program would be as follows:

- Step 1: Heavy equipment (i.e., bulldozers) would be used to install access roads in the areas targeted for revegetation.

A concrete pad with reasonable berms would be installed to mix the sludge and fly ash on-site.
- Step 2: Lime potash application -- Lime and potash would be sprayed on the areas targeted for revegetation. Lime would be applied at approximately 10 tons per acre and potash at 80 pounds actual K per acre.
- Step 3: Sludge-fly ash application -- The sludge-fly ash mixture would be applied by spraying the mixture onto the target area. The sludge- fly ash ratio will be based on further analysis of the field test plots. The sludge will be obtained from the Town of Palmerton, Allentown, and, if necessary, Philadelphia.
- Step 4: Plant target area -- Grasses would be planted by blowing a mixture of grass seed onto the target area. Studies are continuing on the feasibility of also blowing tree seed onto the area. If tree seed will not germinate, seedlings will be planted.
- Step 5: Apply mulch -- To protect the seed and permit germination, adequate mulch will have to be applied. Mulching may be reduced or eliminated if spring oats are planted in the fall. This will provide winter cover that will die by spring. The target areas can then be seeded with the permanent plant species in the spring, and the spring oat stubble will serve as a protective "mulch" cover for the permanent species needed.

DECLARATION

The selected remedy is an interim remedy and is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the preference for treatment that reduces mobility or volume as a principal element. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technol

Date

9/4/57

James M. Self
Regional Administrator

Recommended Alternative

Section 121 of SARA and the current version of the National Contingency Plan (NCP)(50 Fed. Reg. 47912, November 20,1985) establish a variety of requirements relating to the selection of remedial actions under CERCLA. Applying the current evaluation criteria in Table 2 to the three remaining remedial alternatives, we recommend that Alternative 3 be implemented at the Palmerton Zinc Superfund Site.

This is an interim remedy for the site. When the RI/FS's for the other operable units are completed by the responsible parties, ROD's will be issued to address all aspects of the site. This interim remedy will not, however, be inconsistent with a final comprehensive remedy for the site. This interim remedy does not attempt to ensure compliance with all ARARS for the entire site, but as discussed above under Alternative 3, will be consistent, to the extent practicable, with those, action specific ARARS addressing sludge application, the Clean Water Act and, Best Management Practice requirements.

This alternative consists of using a mixture of sewage sludge and fly ash to revegetate the defoliated areas of Blue Mountain. Based on greenhouse studies and results of field tent plots it appears that this technology is feasible.

Although changes may be made to application rates and/or sludge-fly ash ratios, it appears that a general outline of the procedures for the revegetation program would be as follows:

Step 1: Site preparation -- Heavy equipment (i.e., bulldozers) would be used to install access roads in the areas targeted for revegetation.

A concrete pad with reasonable berms would be installed to mix the sludge and fly ash on-site.

Step 2: Lime potash application -- Lime and potash would be sprayed on the areas targeted for revegetation. Lime would be applied at approximately 10 tons per acre and potash at 80 pounds actual K per acre.

Step 3: Sludge-fly ash application -- The sludge-fly ash mixture would be applied by spraying the mixture onto the target area. The sludge- fly ash ratio will be based on further analysis of the field test plots. The sludge will be obtained from the Town of Palmerton, Allentown, and, if necessary, Philadelphia.

Step 4: Plant target area -- Grasses would be planted by blowing a mixture of grass seed onto the target area. Studies are continuing on the feasibility of also blowing tree seed onto the area. It is not yet clear if tree seed will germinate on the site. If tree seed will not germinate, seedlings will be planted.

Step 5: Apply mulch -- To protect the seed and permit it germination, adequate mulch will have to be applied. Mulching may be reduced or eliminated if spring oats are planted in the fall. This will provide winter cover that will die by spring. The target areas can then be seeded with the permanent plant species in the spring, and the spring oat stubble will serve as a protective "mulch" layer for the permanent species seed.

Schedule

The anticipated schedule is to continue with some limited design studies in the Fall of 1987. Beginning as soon as possible, but probably not before the end of 1987, large scale, multi-acre revegetation will begin. It will take a number of years to complete the remedial action, the exact time depending on the amount of sludge available. EPA's goal is to complete the project in five years.



Deputy Secretary for
Environmental Protection

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
Post Office Box 2063
Harrisburg, Pennsylvania 17120
August 20, 1987

Stephen R. Wassersug, Director
Hazardous Waste Management Division
U.S. Environmental Protection Agency
841 Chestnut Building
Philadelphia, PA 19107

Dear Mr. Wassersug:

We have reviewed the draft "Site Description and Summary of Remedial Alternative Selection" Report for the Blue Mountain Revegetation Project. The Department Supports this project and agrees that the trial demonstration plots installed in 1986 proves the viability of preparing a sludge and fly ash mixture to provide a growth media for permanent revegetation of the mountain.

We find the report satisfactory in its present form and have no recommendation. Thank you for the opportunity to review this report.

Sincerely,

Mark M. McClellan